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#### Map of the Lso haplotypes in Europe

 In the POnTE project, various countries in Europe carried out extensive research into the Lso bacterium for the first time. In the EU territory Lso affects mainly carrots and celery, disrupting the market for these products.

## LSO (abbreviation of Calsol)

for *Candidatus* Liberibacter solanacearum. In North America and New Zealand this plant bacterium infects tomatoes and potatoes (*Solanaceae*), causing significant economic damages. In Europe, the infection produces vegetative disorders in plants of the *Apiaceae* family only, especially carrot and celery.



 Along with former research results, the work carried out within the framework of the POnTE project has helped develop new scientific knowledge on the occurrence and genetic diversity of this pathogen, enabling researchers to map the geographical distribution of Lso haplotypes in Europe.

### POnTE Project

The EU Horizon 2020 financed POnTE project started in 2015 and concluded in 2019. POnTE gathered 25 organizations and 120 researchers from 10 EU and three non-EU countries to foster and share knowledge for the prevention, detection, control, and management of a group of plant pests threatening crops, biodiversity, and the economy in Europe.



• In Europe, haplotype C has been found in Finland, Norway, Sweden, Germany, Austria, and Estonia and is associated with disease in carrots. Haplotypes D and E are found in the Mediterranean region.

# genetics, a haplotype is a combination of variants in the

DNA sequence that tend to always occur together. Researchers identified eight Lso haplotypes, tagging them with the letters of the alphabet from A through G plus U. Psyllid

The spread of Lso is strongly related to its vectors, the *psyllids*, or jumping plant lice. These insects are 2-3 millimetres long, and they feed much like aphids do: by sucking the sap from plant tissues. This feeding habit enables them to transmit the Lso bacteria into the plants. Currently, the most effective tool to prevent the spread of Lsoassociated symptoms is to manage the *psyllid* population.

 Significantly, research confirmed that haplotypes A and B are not present in Europe. Both those Lso variants affect mainly potatoes and tomatoes in the US and New Zealand, causing serious damage to those crops. *Bactericera cockerelli*, the psyllid that transmits them to healthy plants, also is not present in Europe.



#### New findings, new questions

On top of that, new findings concerned:

In Finland, haplotype C was detected in carrots as well as in two other apiaceous plants: parsnip and wild chervil.

Extensive surveys conducted during the POnTE project led to the first detection of Lso haplotype D in Israël, of Lso haplotypes D and E in Tunisia, and of haplotype E in Portugal.

In Israel, in Morocco and in Southwestern France, scientists observed slight genetic variations within haplotype D.

These results show that Lso is more widespread in Europe and the Mediterranean region than was previously known. More research is needed to define the host range of the European Lso haplotype and their vectors as well as the environmental requirements for their reproduction and multiplication in order to understand their epidemiology and to be able to predict if they could pose a risk to other cultivated crops.